



DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2022-0516; Project Identifier AD-2022-00262-E; Amendment 39-22157; AD 2022-18-06]

RIN 2120-AA64

Airworthiness Directives; General Electric Company Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for all General Electric Company (GE) GE90-110B1 and GE90-115B model turbofan engines and certain GE90-76B, GE90-85B, GE90-90B, and GE90-94B model turbofan engines. This AD was prompted by the detection of melt-related freckles in the forgings and billets, which may reduce the life of certain rotating compressor discharge pressure (CDP) high-pressure turbine (HPT) seals (rotating CDP seals), interstage HPT rotor seals, and HPT rotor stage 2 disks. This AD requires revising the airworthiness limitations section (ALS) of the applicable GE90-100 Engine Manual (EM) and the operator's existing approved maintenance program or inspection program, as applicable, to incorporate reduced life limits for these parts. This AD also requires the removal and replacement of certain interstage HPT rotor seals, identified by serial number (S/N), installed on GE90-76B, GE90-85B, GE90-90B, and GE90-94B model turbofan engines. The FAA is issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: For service information identified in this final rule, contact General Electric Company, 1 Neumann Way, Cincinnati, OH 45215; phone: (513) 552-3272; email: aviation.fleetsupport@ge.com; website: www.ge.com. You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch,

1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (817) 222-5110.

Examining the AD Docket

You may examine the AD docket at www.regulations.gov by searching for and locating Docket No. FAA-2022-0516; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, any comments received, and other information. The address for Docket Operations is U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: Alexei Marqueen, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7178; email: Alexei.T.Marqueen@faa.gov.

SUPPLEMENTARY INFORMATION:

Background

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to all GE GE90-110B1 and GE90-115B model turbofan engines and certain GE90-76B, GE90-85B, GE90-90B, and GE90-94B model turbofan engines. The NPRM published in the *Federal Register* on May 27, 2022 (87 FR 32098). The NPRM was prompted by notification by the engine manufacturer of the detection of melt-related freckles in the forgings and billets, which may reduce the life of certain rotating CDP seals, interstage HPT rotor seals, and HPT rotor stage 2 disks on GE90-110B1 and GE90-115B model turbofan engines and may reduce the life of certain interstage HPT rotor seals on GE90-76B, GE90-85B, GE90-90B, and GE90-94B model turbofan engines. The manufacturer's investigation determined that, as a result of such freckles forming in the forgings and billets, certain rotating CDP seals, interstage HPT rotor seals, and HPT rotor stage 2 disks (life-limited parts (LLPs)) may have undetected subsurface anomalies that developed during the manufacturing process, resulting in reduced material properties and a lower fatigue life capability. Reduced material properties may cause premature LLP fracture, which could result in uncontained debris

release. As a result of its investigation, the manufacturer determined the need to reduce the life limits of certain LLPs. To reflect these reduced life limits, the manufacturer revised the ALS of the affected GE90-100 EMs. Additionally, the manufacturer published service information that specifies procedures for the removal and replacement of certain interstage HPT rotor seals installed on GE90-76B, GE90-85B, GE90-90B, and GE90-94B model turbofan engines. In the NPRM, the FAA proposed to require revising the ALS of the applicable GE90-100 EM and the operator's existing approved maintenance program or inspection program, as applicable, to incorporate reduced life limits for certain LLPs. The NPRM also proposed to require the removal and replacement of certain interstage HPT rotor seals. The FAA is issuing this AD to address the unsafe condition on these products.

Discussion of Final Airworthiness Directive

Comments

The FAA received comments from six commenters. The commenters were Air Line Pilots Association, International (ALPA), American Airlines, The Boeing Company (Boeing), FedEx Express, Japan Airlines, and United Airlines. Five of the commenters, ALPA, American Airlines, Boeing, FedEx Express, and United Airlines, supported the proposal without change. The following presents the comment received on the NPRM and the FAA's response.

Request to Refer to Service Information

Japan Airlines requested that the FAA refer to GE90 SB 72-1211, latest revision, in the AD as the appropriate source of service information for the required actions. Japan Airlines noted that this would confirm the source of the affected interstage HPT rotor seal for the GE90-76B, GE90-85B, GE90-90B, and GE90-94B model engines. The FAA infers that Japan Airlines is requesting for GE90 SB 72-1211 to be incorporated by reference. The FAA disagrees with the request to incorporate GE90 SB 72-1211 by reference. Paragraph (c)(2) of this AD identifies the affected interstage HPT rotor seal installed on the GE90-76B, GE90-85B, and GE90-94B model turbofan engines by part number and serial number. The FAA did not change this AD as a result of this comment.

Conclusion

The FAA reviewed the relevant data, considered any comments received, and determined that air safety requires adopting this AD as proposed. Accordingly, the FAA is issuing this AD to address the unsafe condition on these products. Except for minor editorial changes, this AD is adopted as proposed in the NPRM. None of the changes will increase the economic burden on any operator.

Related Service Information

The FAA reviewed GE GE90-100 SB 72-0851 R00, dated August 17, 2021. This service information provides reduced life limits for certain LLPs. The FAA also reviewed GE GE90 SB 72-1211 R00, dated March 9, 2022. This service information describes procedures for removing and replacing certain interstage HPT rotor seals.

Costs of Compliance

The FAA estimates that this AD affects 248 engines installed on airplanes of U.S. registry. The FAA estimates that zero engines installed on airplanes of U.S. registry will require replacement of the interstage HPT rotor seal.

The FAA estimates the following costs to comply with this AD:

Estimated costs

Action	Labor Cost	Parts Cost	Cost per product	Cost on U.S. operators
Revise ALS of EM and the operator's existing approved maintenance program or inspection program	1 work-hour x \$85 per hour = \$85	\$0	\$85	\$21,080
Replace interstage HPT rotor seal	1,500 work-hours x \$85 per hour = \$127,500	\$286,331	\$413,831	\$0

Authority for this Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a "significant regulatory action" under Executive Order 12866,
- (2) Will not affect intrastate aviation in Alaska, and
- (3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

The Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39 - AIRWORTHINESS DIRECTIVES

- 1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

2. The FAA amends § 39.13 by adding the following new airworthiness directive:
2022-18-06 General Electric Company: Amendment 39-22157; Docket No. FAA-2022-0516; Project Identifier AD-2022-00262-E.

(a) Effective Date

This airworthiness directive (AD) is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

(b) Affected ADs

None.

(c) Applicability

This AD applies to:

(1) General Electric Company (GE) GE90-110B1 and GE90-115B model turbofan engines; and

(2) GE GE90-76B, GE90-85B, GE90-90B, and GE90-94B model turbofan engines with an installed interstage high-pressure turbine (HPT) rotor seal with part number (P/N) 2629M47P01 and serial number (S/N) NCU5430D.

(d) Subject

Joint Aircraft System Component (JASC) Code 7230, Turbine Engine Compressor Section, and JASC Code 7250, Turbine Section.

(e) Unsafe Condition

This AD was prompted by the detection of melt-related freckles in the forgings and billets, which may reduce the life of certain rotating compressor discharge pressure (CDP) HPT seals (rotating CDP seals), interstage HPT rotor seals, and HPT rotor stage 2 disks. The FAA is issuing this AD to prevent failure of the rotating CDP seal, interstage HPT rotor seal, and HPT rotor stage 2 disk. The unsafe condition, if not addressed, could result in uncontained debris release, damage to the engine, and damage to the airplane.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Required Actions

(1) For affected GE90-110B1 and GE90-115B model turbofan engines, within 90 days after the effective date of this AD, revise the airworthiness limitations section (ALS) of the existing GE90-100 Engine Manual (EM) and the operator's existing approved maintenance program or inspection program, as applicable, by inserting the following information:

(i) For rotating CDP seal P/N 2479M03P01, insert the information in Table 1 to paragraph (g)(1)(i) of this AD.

Table 1 to Paragraph (g)(1)(i) – Rotating CDP Seal P/N 2479M03P01

Part Name	Part Number	Life Cycles
Seal, CDP	2479M03P01 For part serial numbers NOT listed in SB 72-0851, latest revision	15,000
Seal, CDP	2479M03P01 For part serial numbers listed in SB 72-0851, latest revision APPENDIX A Table 11	5,300
Seal, CDP	2479M03P01 For part serial numbers listed in SB 72-0851, latest revision APPENDIX A Table 12	10,400
Seal, CDP	2479M03P01 For part serial numbers listed in SB 72-0851, latest revision APPENDIX A, Table 13	13,900

(ii) For interstage HPT rotor seal P/N 2505M72P01, insert the information in Table 2 to paragraph (g)(1)(ii) of this AD.

Table 2 to Paragraph (g)(1)(ii) – Interstage HPT Rotor Seal P/N 2505M72P01

Part Name	Part Number	Life Cycles
Seal, Interstage	2505M72P01 For part serial numbers NOT listed in SB 72-0851, latest revision	15,000
Seal, Interstage	2505M72P01 For part serial numbers listed in SB 72-0851, latest revision APPENDIX A Table 8	5,500
Seal, Interstage	2505M72P01 For part serial numbers listed in SB 72-0851, latest revision APPENDIX A Table 9	10,900
Seal, Interstage	2505M72P01 For part serial numbers listed in SB 72-0851, latest revision APPENDIX A Table 10	14,300

(iii) For HPT rotor stage 2 disk P/N 2505M73P03, insert the information in Table 3 to paragraph (g)(1)(iii) of this AD.

Table 3 to Paragraph (g)(1)(iii) – HPT Rotor Stage 2 Disk P/N 2505M73P03

Part Name	Part Number	Life Cycles
Disk, Stage 2	2505M73P03 For part serial numbers NOT listed in SB 72-0851, latest revision	15,000
Disk, Stage 2	2505M73P03 For part serial numbers listed in SB 72-0851, latest revision APPENDIX A Table 1	3,500
Disk, Stage 2	2505M73P03 For part serial numbers listed in SB 72-0851, latest revision APPENDIX A Table 2	5,100
Disk, Stage 2	2505M73P03 For part serial numbers listed in SB 72-0851, latest revision APPENDIX A Table 3	5,800
Disk, Stage 2	2505M73P03 For part serial numbers listed in SB 72-0851, latest revision APPENDIX A Table 4	7,200
Disk, Stage 2	2505M73P03 For part serial numbers listed in SB 72-0851, latest revision APPENDIX A Table 5	8,000
Disk, Stage 2	2505M73P03 For part serial numbers listed in SB 72-0851, latest revision APPENDIX A Table 6	8,300
Disk, Stage 2	2505M73P03 For part serial numbers listed in SB 72-0851, latest revision APPENDIX A Table 7	8,800

(2) For affected GE90-76B, GE90-85B, GE90-90B, and GE90-94B model turbofan engines, before the interstage HPT rotor seal, P/N 2629M47P01 and S/N NCU5430D, accumulates 7,400 cycles since new, remove the affected interstage HPT rotor seal from service and replace with a part eligible for installation.

(h) Definitions

For the purpose of this AD, a “part eligible for installation” is any interstage HPT rotor seal that does not have P/N 2629M47P01 and S/N NCU5430D.

(i) Alternative Methods of Compliance (AMOCs)

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in paragraph (j)(1) of this AD and email to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

(j) Related Information

(1) For more information about this AD, contact Alexei Marqueen, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7178; email: Alexei.T.Marqueen@faa.gov.

(2) For service information identified (but not incorporated by reference) in this AD, contact General Electric Company, 1 Neumann Way, Cincinnati, OH 45215; phone: (513) 552-3272; email: aviation.fleetsupport@ge.com; website: www.ge.com. You may view this referenced service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (817) 222-5110.

(k) Material Incorporated by Reference

None.

Issued on August 18, 2022.

Christina Underwood, Acting Director,
Compliance & Airworthiness Division,
Aircraft Certification Service.

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